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Re-appraisal of *Scolecopeltidium*

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Abstract — The five new species included in the original circumscription of *Scolecopeltidium* are re-examined, redescribed, and illustrated. *Scolecopeltidium mirabile* and *S. hormosporum* are retained in *Scolecopeltidium*, while *S. liciniae* is lectotypified and transferred to *Scolecopeltis*, and *S. costi* and *S. multiseptatum* are transferred to *Micropeltis*.

Key words — *Dothideomycetes*, morphological characters, taxonomy

Introduction

Scolecopeltidium, which was established by Stevens & Manter (1925), comprises species that lack superficial mycelium and are foliar epiphytes on leaves. In *Scolecopeltidium* thyriothecia are relatively large, circular, and blue-green with a central rounded irregular ostiole and poorly developed basal peridium. The upper thyrothecial wall consists of an irregular meandering arrangement of compact hyphae (Wu et al. 2011a). The dense filamentous hamathecium comprises pseudoparaphyses embedded in mucilage surrounding the asci, which are inclined towards the center. Asci are bitunicate or fissitunicate, obclavate, and pedicellate, lacking an ocular chamber, and containing fasciculate long cylindrical to filiform ascospores (Wu et al. 2011a). Stevens & Manter (1925) introduced eleven species in *Scolecopeltidium* (five new to science and six new combinations) but did not indicate any type for the genus. The earliest designation of a generic type was by Clements & Shear (1931), who selected *S. salacense* (Racib.) F. Stevens & Manter (and also proposed the superfluous replacement name, *Scolecopeltium*). *Scolecopeltidium* has until recently been listed as a genus of *Microthyriaceae*, although Lumbsch & Huhndorf (2010) suggested that the placement in this family is uncertain.

Batista (1959), who redescribed the genus, added many taxa and brought the total to 69 species. He retained *S. salacense* within *Scolecopeltidium* but designated *S. mirabile* as a substitute generic type; however this re-typification is inadmissible (ICN Art. 10.5; McNeill et al. 2012). Species were distinguished based on ascoma color and size and ascospore septation. Batista's (1959) placement of *Scolecopeltidium* in *Micropeltidaceae* was confirmed by Wu et al. (2011a). There are currently no molecular data for any *Scolecopeltidium* species.

Mistakenly following Batista (1959) in treating *S. mirabile* as the generic type, Wu et al. (2011a) provided a description and plate based on a 1931 Stevens collection. The correct generic type, *S. salacense*, is described as having 8-spored asci, copious paraphyses, and 6–12-septate ascospores (Raciborski 1900; Stevens & Manter 1925), but we have been unable to locate any authentic specimen of *S. salacense*.

We redescribe and illustrate the generic types of *Dothideomycetes* (Zhang et al. 2008, 2009, 2012; Wu et al. 2010, 2011a,b) and, where possible, have selected fresh specimens for epitypification and molecular analysis to provide a natural classification (e.g., Wu et al. 2011a; Chomnunti et al. 2011). In this paper, we re-examine the five new species described in *Scolecopeltidium* by Stevens & Manter (1925).

Materials & methods

Type specimens of the species were obtained from NY and ILL (for full names of herbaria see http://sweetgum.nybg.org/ih/index.php). The methods follow those of Wu et al. (2011a).

Taxonomy

Micropeltidaceae

Wu et al. (2011a) illustrated *Micropeltis applanata* Mont. (type species of *Micropeltidaceae*) and transferred *Byssopeltis* and *Scolecopeltidium* to the family. *Scolecopeltidium*, *Scolecopeltis*, and *Micropeltis* can be differentiated morphologically based on the presence or absence of pseudoparaphyses and shape and septation of ascospores. Studies at the molecular level are needed to confirm the separation of genera based on these characters.

Key to the genera of the *Micropeltidaceae* discussed in this paper

1. Ascospores either spindle-shaped to fusiform or filiform to long clavate; pseudoparaphyses (usually) present. 2
1. Ascospores spindle-shaped to fusiform; pseudoparaphyses absent . . *Scolecopeltis*
2. Ascospores >5-septate . . . . . *Scolecopeltidium*
2. Ascospores 2–5-septate . . . . . *Micropeltis*

Scolecopeltidium F. Stevens & Manter, Bot. Gaz. 79(3): 282 (1925)

Type: *Scolecopeltidium salacense* (Racib.) F. Stevens & Manter, Bot. Gaz. 79(3): 282 (1925) as "*salacensis*". [Designated by Clements & Shear 1931: 304, sub "*Scolecopeltium*".] [Type specimen not seen.]

Foliar epiphytes on leaves, lacking superficial mycelium. Thyriothecia relatively large, circular, scattered, membranaceous or submembraneous, superficial, blue-green to dark-green or black, base poorly developed, with a central rounded irregular ostiole; in section lenticular. Upper wall comprising an irregular meandering arrangement of compact hyphae. Peridium a single stratum, comprising one to several layers of compact brownish black pseudoparenchymatous cells. Hamathecium of dense, filamentous, pseudoparaphyses, embedded in mucilage, surrounding the asci, which are inclined towards the center. Asci 2–8-spored, bitunicate, fissitunicate, obclavate, pedicellate, ocular chamber not observed. Ascospores fasciculate, spindle-shaped or fusiform to long cylindrical or filiform, tapering towards the base.

Anamorphs: Not established for the genus (Hyde et al. 2011).

Notes: We retain *S. mirabile* and *S. hormosporum* in *Scolecopeltidium*.

Scolecopeltidium mirabile F. Stevens & Manter, Bot. Gaz. 79(3): 283 (1925)

This species was described and illustrated in Wu et al. (2011a) based on a collection of Stevens, on leaves of *Diospyros aherni* from Philippines on 18 January 1931, NY 2021. Although the host and distribution differ, there are only minor differences between the original description (specimens from Kartabo, Guyana) and the 1931 Stevens specimen described in Wu et al. (2011a). Although Wu et al. described the 1931 Stevens specimen's asci as 8-spored and the ascospores as having 28–38 septa, the original description cited asci as 2–4-spored and ascospores as having up to 48 septa.

Scolecopeltidium hormosporum F. Stevens & Manter, Bot. Gaz. 79(3): 283 (1925) Plate 1

Foliar epiphytes on the upper surface of leaves, lacking superficial mycelium. Thyriothecia 1940–2960 μm diam × 75–95 μm high, relatively large, scattered, superficial, carbonaceous, rounded from above, blue-green to black, base wall poorly developed, with a central rounded irregular ostiole; in section lenticular. Upper wall comprising an irregular meandering arrangement of compact hyphae. Peridium 16.8–22.5 μm wide, a single stratum, composed one to several layers of brown-black and compact pseudoparenchymatous cells. Hamathecium of dense, 1–2 μm wide, filamentous, branched pseudoparaphyses embedded in mucilage, longer than, and surrounding the asci. Asci 90–125 × 13.5–33 μm when young, 175–195 × 33.5 × 54.5 μm (mean = 159.9 × 43.9 μm, n = 15) at maturity, 3–6-spored, fusiform, pedicel short, with a distinctive but small ocular chamber. Ascospores 150–160 × 8.5–9.5 μm (mean = 156.5 × 9 μm, n = 20),

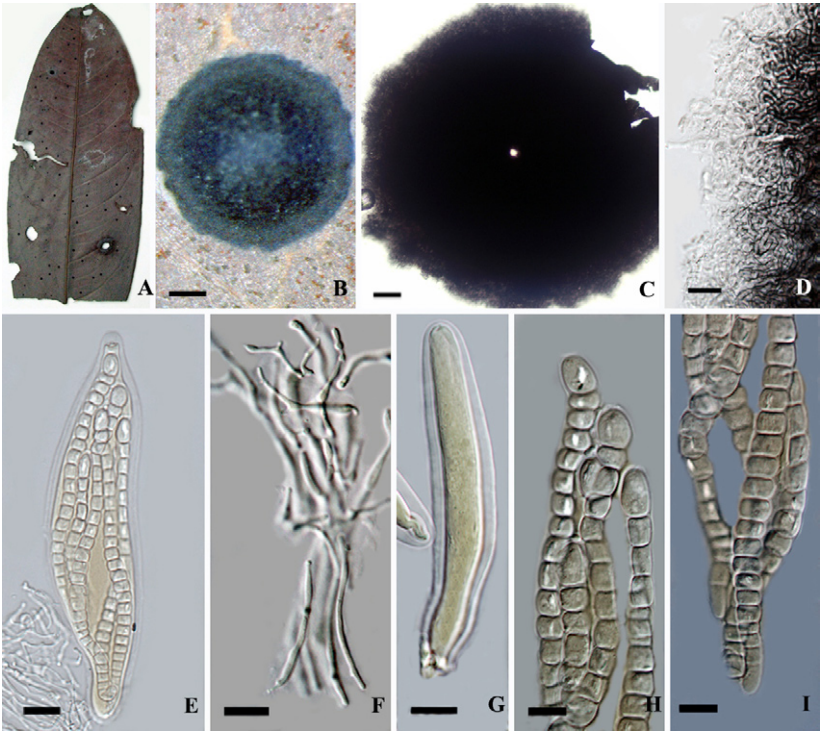

Plate 1. *Scolecopeltidium hormosporum* (holotype, ILL6779). A, B. Appearance of ascomata on the host leaf surface. C, D. Squash mounts of ascoma showing strutures of tissues. E, G. Asci. F. Pseudoparaphyses. H, I. Ascospores with numerous septa. Scale bars: B = 500 µm, C, E = 20 µm, D, F–I = 10 µm.

filiform to long cylindrical, apex widest (about 9.5 µm), end cells slightly elongate and wide, other cells spherical, hyaline, with 22–28 septa, constricted at septa, and curved in the ascus, immature spores with only one cell.

Material examined: **GUYANA** (British Guiana), Kartalo, on unknown host, 23 July 1922, F.L. Stevens No. 581 (ILL6779, holotype).

Scolecopeltis Speg., Boln. Acad. nac. Cienc. Córdoba 11(4): 574 (1889)

Type species: *Scolecopeltis tropicalis* Speg., Boln. Acad. nac. Cienc. Córdoba 11(4): 574 [no. 369] (1889)

Foliar epiphytes on leaves, lacking superficial mycelium. Thyriothecia, circular, scattered, membranaceous or submembraneous, superficial, blue-green to black brown, base poorly developed, with a central rounded ostiole; in section lenticular. Upper wall composed of irregularly meandering and interwoven compact hyphae. Peridium a single stratum, composed of one to several layers of compact brownish black pseudoparenchymatous cells. Pseudoparaphyses

absent. Asci (4–) 8-spored, bitunicate, fissitunicate, obclavate, pedicellate, ocular chamber not observed. Ascospores, overlapping, spindle-shaped to fusiform, with more than 10 septa.

Anamorphs: None reported.

Notes: *Scolecopeltis* differs from *Scolecopeltidium* in lacking a hamathecium of pseudoparaphyses (Stevens & Manter 1925). We transfer *Scolecopeltidium liciniae* to *Scolecopeltis*.

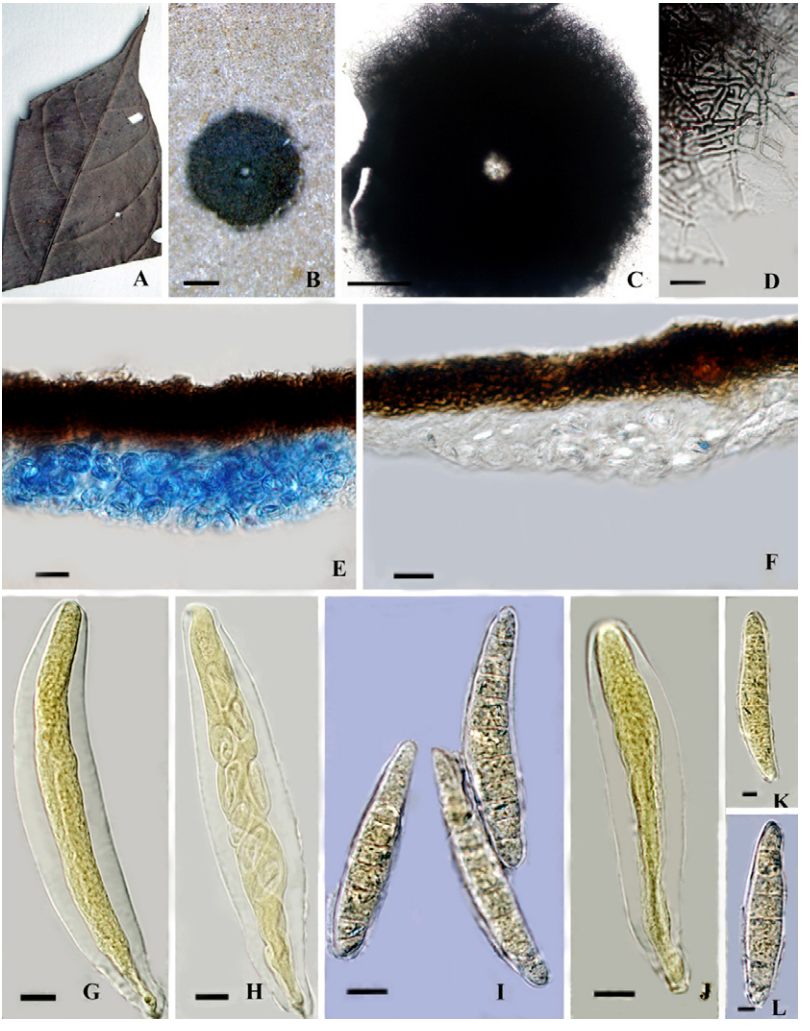

Plate 2. *Scolecopeltis liciniae* (lectotype, ILL6780). A, B. Appearance of ascomata on the host surface. C, D. Squash mount of ascomata. E, F. Section of ascomata. G, H, J. Immature asci. I, K, L. Ascospores. Scale bars: B = 500 µm, C = 200 µm, D–J = 10 µm, E = 20 µm, K, L = 5 µm.

Scolecopeltis liciniae (F. Stevens & Manter) H.X. Wu & K.D. Hyde, **comb. nov.**

MycoBank number: MB801935 Plate 2

≡ *Scolecopeltidium liciniae* F. Stevens & Manter, Bot. Gaz. 79(3): 283 (1925)

Type: Guyana (British Guiana), Rockstone, on leaves of *Licinia* sp., 17 July 1922, F.L. Stevens No. 479 (**Lectotype designated here**, ILL6780).

Foliar epiphytes on the lower surface of leaves of *Licinia* sp. (*Liliaceae*), lacking superficial mycelium. Thyriothecia 1500–1600 µm diameter, scattered, superficial, blue-green, membranaceous or submembraneous, rounded, within loosely interwoven hyphae at the margin, dome-like in section, with a rounded ostiole. Peridium 14.5–16.5 µm thick, composed of interwoven hyphae, lacking at the base. Hamathecium of sparse, paraphyses absent, surrounded by mucilage and themselves surrounding asci, which form from the tissues at the circumference and base. Asci 99–139 × 20–27.5 µm (mean = 115.5 × 23.3 µm, n = 15), 8-spored, cylindro–clavate, with a short pedicel about 1.5 × 1 µm, ocular chamber not observed. Ascospores 65.7–76.8 × 8.1–12 µm (mean = 69.9 × 10.1 µm, n = 20), overlapping, spindle-shaped to fusiform, 11–13 septa, rounded towards the apex, tapering towards the base, middle cells wider, conical, hyaline, slightly constricted at septa.

Notes: Stevens & Manter (1925) cited two collections [syntypes] in the protologue of *S. liciniae*: No. 423 [ILL 6781] and No. 479 [ILL 6780], both conserved in Stevens' herbarium at ILL. However, ILL 6781 represents a different species with pseudoparaphyses and 3-celled ascospores. We therefore designate ILL 6780 (on *Licinia* sp.) as lectotype.

Micropeltis Mont., Ann. Sci. Nat., Bot., sér. 2, 17: 122 (1842)

Type species: *Micropeltis applanata* Mont., Annls Sci. Nat., Bot., sér. 2, 17: 122 (1842)

Foliar epiphytes on the surface of leaves, superficial mycelium absent or not observed. Thyriothecia circular, gregarious, superficial, membranous, bluish or greenish to black, lower peridium poorly developed, easily removed from the host surface, with a central irregular ostiole; lenticular in section. Upper wall composed of irregularly meandering compact hyphae. Peridium black to light brown, comprising two strata, outer cells black and compact, inner cells comprising a textura angularis of loose light brown cells. Hamathecium consisting of asci embedded in mucilage and inclined toward the central ostiole with sparse or evanescent pseudoparaphyses present. Asci 6–8-spored, bitunicate, fissitunicate, obclavate to widely fusiform, pedicellate, ocular chamber not obvious. Ascospores overlapping 2–3-seriate, hyaline, long clavate to elliptic, trans-septate, smooth-walled.

Anamorphs: None reported.

Notes: *Micropeltis* differs from *Scolecopeltidium* in having fewer septa in its ascospores (Stevens & Manter 1925). We transfer *Scolecopeltidium costi* and *S. multiseptatum* to *Micropeltis*.

Micropeltis costi (F. Stevens & Manter) H.X. Wu & K.D. Hyde, **comb. nov.** Plate 3

MycoBank number: MB801936

≡ *Scolecopeltidium costi* F. Stevens & Manter, Bot. Gaz. 79(3): 284 (1925)

Foliar epiphytes on the upper surface of leaves, lacking superficial mycelium. Thyriothecia 830–1120 µm diam × 45–51 µm high, rounded,

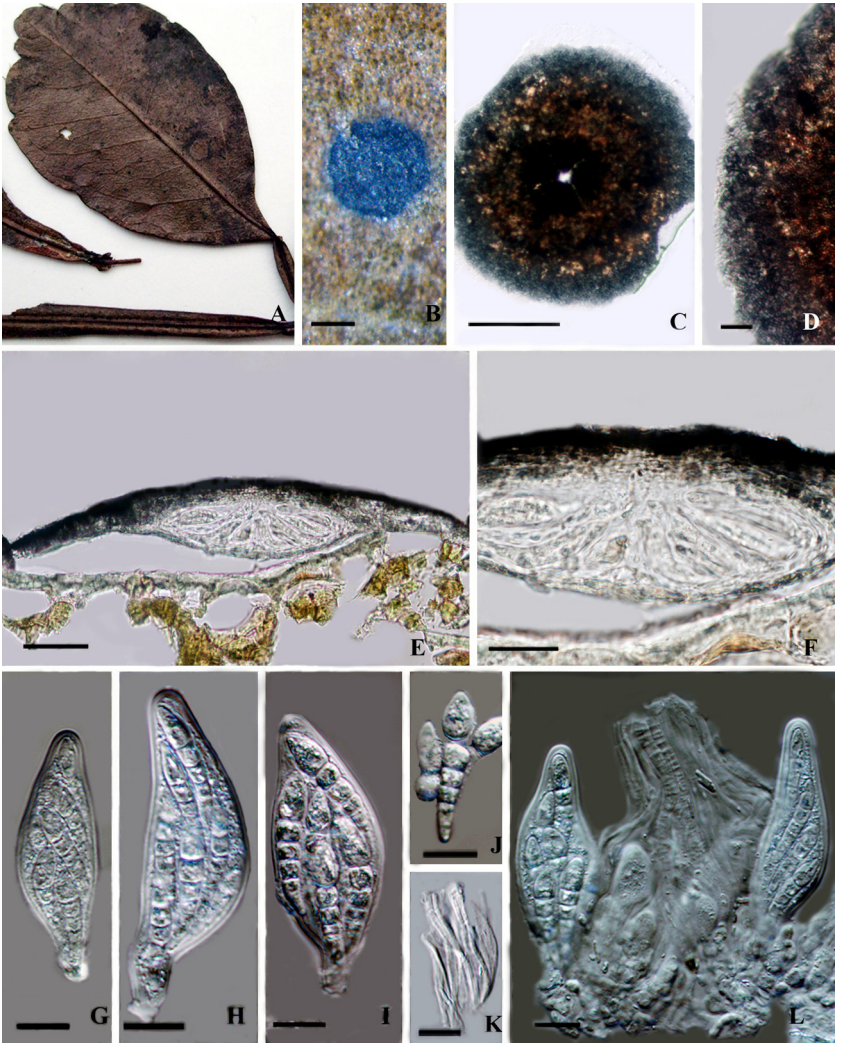

Plate 3. *Micropeltis costi* (holotype, NY585). A, B. Appearance of colony and thyriothecia on the host surface.C, D. Squash mount of ascoma. E, F. Section of ascomata. G–I, L. Asci. J. Ascospores with 4–5 septa.K. Pseudoparaphyses. Scale bars: B = 500 µm, C = 60 µm, D,F = 20 µm, E = 40 µm, G–L = 10 µm.

scattered, membranaceous or submembraneous, superficial, blue-green, basal peridium lacking, with a central rounded ostiole; dome-like in section. Upper wall comprising an irregular meandering arrangement of hyphae, with loosely interwoven hyphae at the margin. Peridium 5–10 µm wide, a single stratum, composed one to several brownish black to light brown layers outside compact pseudoparenchymatous cells. Hamathecium of dense, filiform 2 µm wide pseudoparaphyses, embedded in mucilage, surrounding the asci inclined towards the center. Asci 40–58 ×11–22µm (mean = 50.7 ×15.8 µm, n = 15), 8-spored, bitunicate, fissitunicate dehiscence not observed, broadly fusiform, with a 5 µm wide × 6 µm long pedicel. Ascospores 20–28 × 4–5 µm (mean = 22.8 × 4.5 µm, n = 20), 4–5 overlapping, elliptic or spindle-shaped, hyaline, 4–5 septa, slightly constricted at septa, with middle cells larger and round, smooth-walled.

Material examined: **GUYANA** (British Guiana), Kartabo, on leaves of *Serjania paucidentata*, 23 July 1922, F.L. Stevens (NY585, holotype).

Micropeltis multiseptata (F. Stevens & Manter) H.X. Wu & K.D. Hyde, **comb. nov.**

MycoBank number: MB801937 Plate 4

≡ *Scolecopeltidium multiseptatum* F. Stevens & Manter, Bot. Gaz. 79(3): 283 (1925)

Foliar epiphytes on the upper surface of leaves, lacking superficial mycelium. Thyriothecia 1270–1350 µm diameter × 76–80.5 µm high, scattered, superficial, blue-green, membranaceous or submembranaceous, basal peridium lacking, with a central rounded ostiole; dome–like in section. Upper wall comprising an irregular meandering arrangement of hyphae, with loosely interwoven hyphae at the margin. Peridium 19.5–21.5 µm thick, composed three layers of compact pseudoparenchymatous cells in which the outer layer is black, the middle of layer is blue-green, and the inner layer is hyaline. Hamathecium of dense filamentous crooked pseudoparaphyses, 1–1.5 µm wide, embedded in mucilage, surrounding the asci. Asci 69–80 × 22–25 µm (mean = 73 × 23.7 µm; n = 15), 2–4-spored, obclavate to widely fusiform, with a 3–4 µm wide × 4–5 µm long pedicel. Ascospores 27–37 × 8–9.5 µm (mean = 35.5 × 8.5µm, n = 20), 2–3-seriate, elliptic or spindle-shaped, slightly constricted at the septa, hyaline, with 3–4 septa.

Material examined: **GUYANA** (British Guiana), Wismar, on leaves of *Philodendron* sp., 24 July 1922, F.L. Stevens (NY 1004, isotype).

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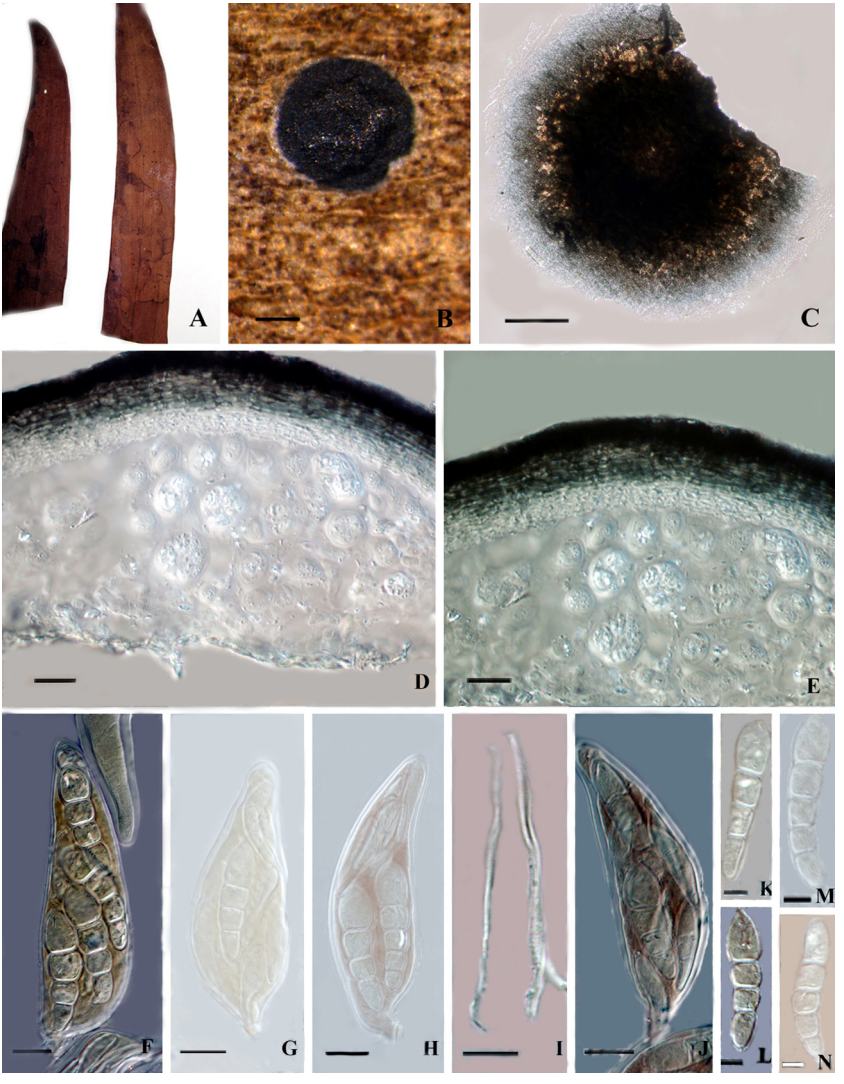

Plate 4. *Micropeltis multiseptata* (isotype, NY 1004). A, B. Appearance of ascomata on the host surface. C. Squash mount of ascoma. D, E. Section of ascoma. The peridium comprises three layers. F–-H, J. Obclavate asci. I. Pseudoparaphyses. K–N. Ascospores with 4–5 septa. Scale bars: B = 500 μm, C = 30 μm, D–J = 10 μm, K–N = 5 μm.

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